“Ley de Ohm”

Practice 2

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# Practice development

## Dependency of Voltage

Without turning on the voltage source and set at 2.5 KΩ the value of the potentiometer. Build the circuit of the figure 1 using the protoboard. Once built, turn on the voltage source and now change its value from 0V to 15V as showed on the table 1.

Imagen que contiene texto

Descripción generada automáticamente

R=1KΩ ½ Watt

Potentionmeter

Figure 1. Circuit

Table 1. Values of electric currents

|  |  |  |
| --- | --- | --- |
| Voltage source (V) | Electric current (measured) | Electric current (Calculated) |
| 0 | 4.13 µ amps | 0 amps |
| 1 | 253.93 µ amps | 0.282 milliamps |
| 2 | 486.4 µ amps | 0.563 milliamps |
| 3 | 0.7273 milliamps | 0.845 milliamps |
| 4 | 0.9938 milliamps | 1.127 milliamps |
| 5 | 1.238 milliamps | 1.409 milliamps |
| 6 | 1.4761 milliamps | 1.69 milliamps |
| 7 | 1.7152 milliamps | 1.972 milliamps |
| 8 | 1.9585 milliamps | 2.253 milliamps |
| 9 | 2.2080 milliamps | 2.535 milliamps |
| 10 | 2.4572 milliamps | 2.817 milliamps |
| 11 | 2.7110 milliamps | 3.098 milliamps |
| 12 | 2.9357 milliamps | 3.38 milliamps |
| 13 | 3.1950 milliamps | 3.661 milliamps |
| 14 | 3.4458 milliamps | 3.944 milliamps |
| 15 | 3.6832 milliamps | 4.224 milliamps |

Now we put the data on a graph to look at the differences of the empiric way and the math way.

## dependency on resistance

With the voltage source turned off, set the value of the potentiometer to zero ohms. Build the circuit showed on the figure 2, using a protoboard. Once it is armed turn on the voltage source and set its value to 15V. After that, vary the value of the potentiometer.

Imagen que contiene texto

Descripción generada automáticamente

Potentionmeter

R= 1Ω ½ Watt

Figure 2. Circuit

Table 2. Value of resistances and electric currents

|  |  |  |  |
| --- | --- | --- | --- |
| Value of the potentiometer | Total resistance | Electric current (measured) | Electric current (calculated) |
| 0 | 1 KΩ | 15.16 milliamps | 15 milliamps |
| 250 | 1.25 KΩ | 12.05 milliamps | 12 milliamps |
| 500 | 1.5 KΩ | 10.053 milliamps | 10 milliamps |
| 750 | 1.75 KΩ | 8.569 milliamps | 8.57 milliamps |
| 1000 | 2 KΩ | 7.415 milliamps | 7.5 milliamps |
| 1250 | 2.25 KΩ | 6.515 milliamps | 6.6 milliamps |
| 1500 | 2.5 KΩ | 6.013 milliamps | 6 milliamps |
| 1750 | 2.75 KΩ | 5.405 milliamps | 5.45 milliamps |
| 2000 | 3 KΩ | 5.019 milliamps | 5 milliamps |
| 2250 | 3.25 KΩ | 4.495 milliamps | 4.615 milliamps |
| 2500 | 3.5 KΩ | 4.209 milliamps | 4.285 milliamps |

Now we repeat the method of the graph, for the same reason.

## Calculation of the electric power in resistances

Before you connect the voltage source, set it to 1V, now turn it off and without using your protoboard, build the circuit showed on the figure 3, use a resistance of 1KΩ with ¼ Watt, once it is built, turn on the voltage source.

Imagen que contiene texto

Descripción generada automáticamente

R= 1Ω ½ Watt

Figure 3. Circuit

What is the value of the electric current? I = 1 milliamp.

What is the value of the electric power which the resistance dissipates? 1 milliwatt.

What is the effect in the resistance? It absorbed electric current.

Why? That is the objective of the power.

Now, use the same circuit, but in this attempt, use a resistance of 1Ω with 1 watt, now repeat the process, make sure that you set the max value of the ammeter.

What is the value of the electric current? I = 300 milliamps.

What is the value of the electric power which the resistance dissipates? 0.09 watts.

What is the effect in the resistance? It absorbed electric current.

What is the difference with the last circuit? It did the same thing but not with the same values.

Why? Because the values of the resistances.

# Conclusions

## Cabañas Baxcajay Jesús Francisco

Thanks to this practice, we learn about how resistances and potentiometers work, and the way we can use them for other projects. Although, it is easy to measure the values from the resistances. We observe that they always vary their values, and there are many factors that affect them.

## Hernández Velázquez Ángel

In this practice, we could observe how the resistance affects several variables within the circuit, which preserves the law of ohm, we also saw how it is that having a variable resistance, as it is the potentiometer, being in series, the resistances they were added and we obtained the expected result, in case they had been in parallel, the result would have been the inverse of the sum of their inverses.

## Martínez Coronel Brayan Yosafat

Now we can talk about the dependency of the variables, we have just checked the law of Ohm, and it is very interesting, but what about the electric power, I mean, I have never done something like this, even talking about electricity makes feel like I am going to get into trouble. But with every practice, I think I trust in myself more than before. It is getting better and better. I have never taught we can make things like this. Now I believe we need more engineers in our nation. Maybe one day, every Mexican could talk about electricity with the same frequency as soccer, and I hope I will be one of the.

# Calculations

For the 1st Circuit:

V=IR; **I=V/R** where R=(2.5KΩ+1KΩ)

So, **I = V / 3500Ω**

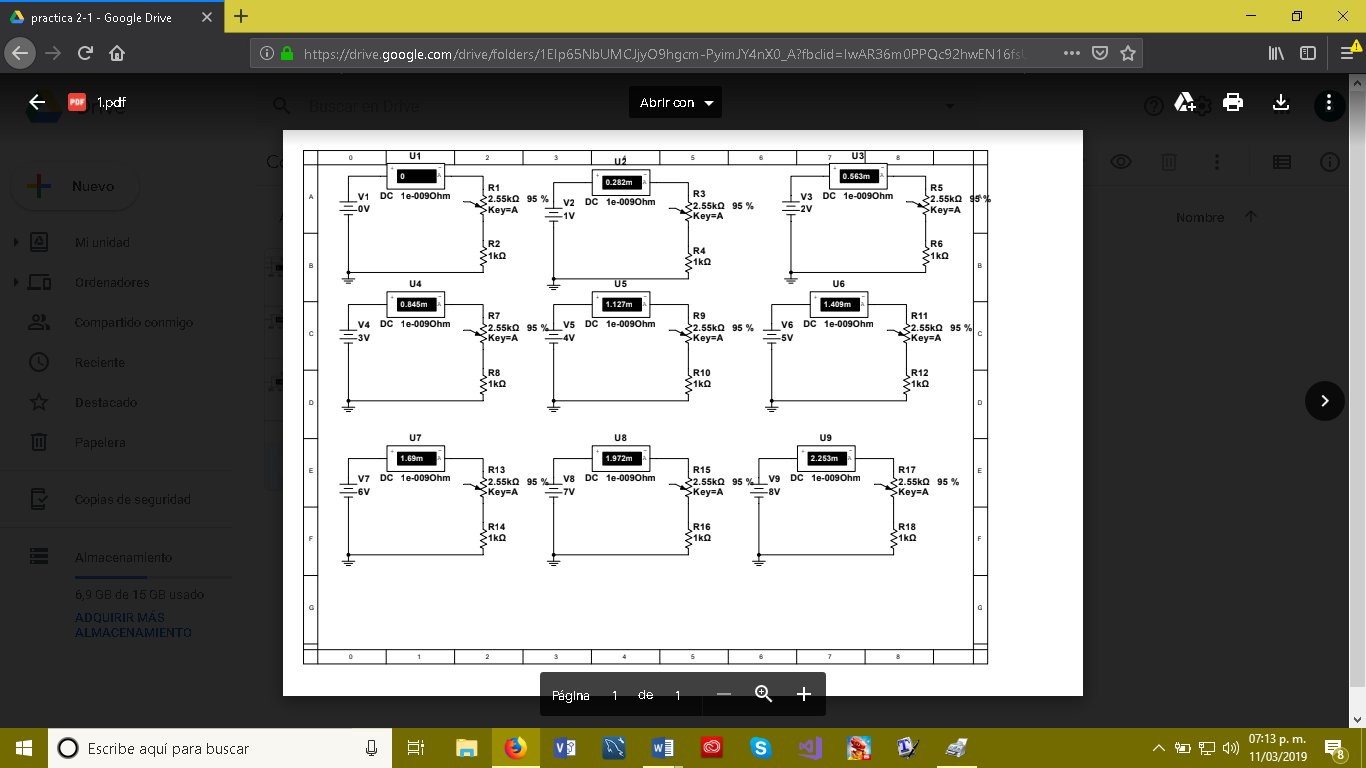
Then, we just substitute voltage from 0 to 15 Volts.

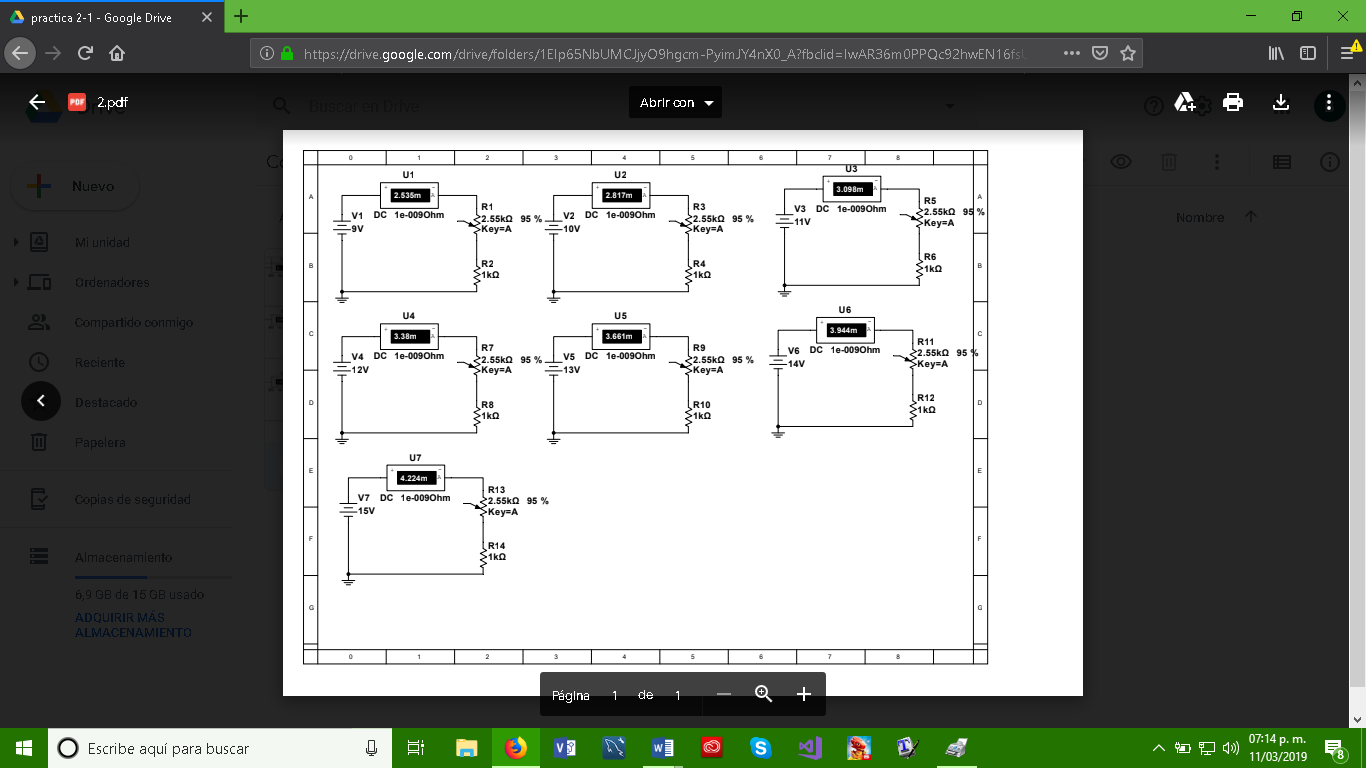
For 2nd circuit:

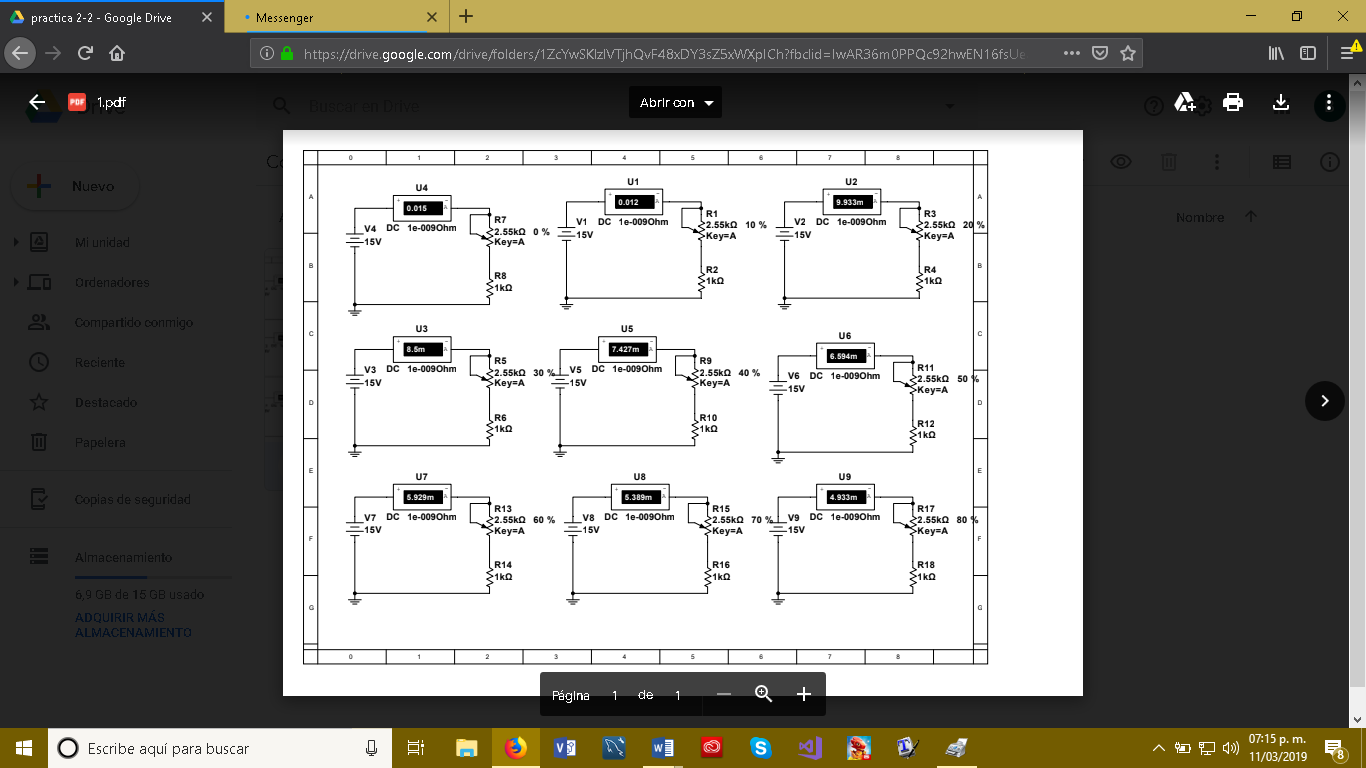
I = V / R, where Voltage = 15 V and Resistance = 1000Ω + Rp (Resistance from the potentiometer from 0 to 2500Ω).

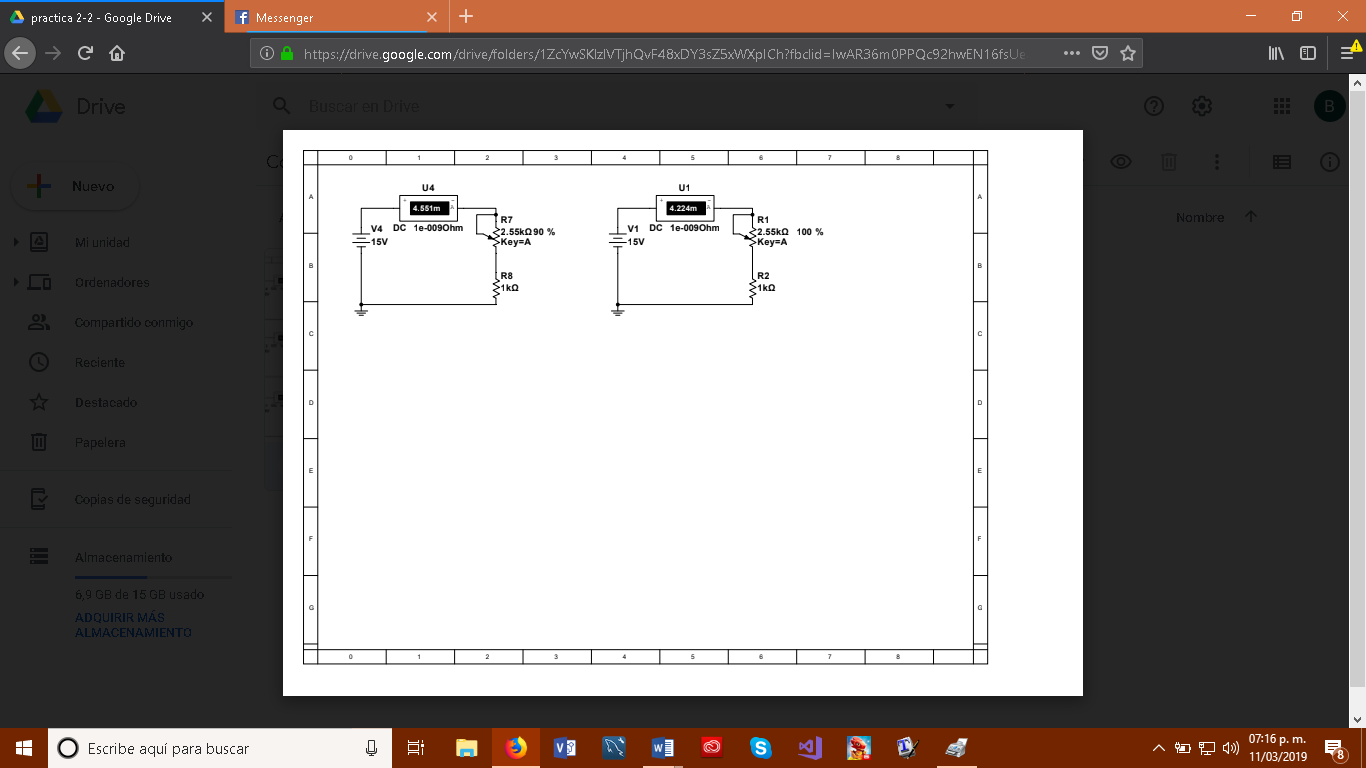
So, **I = 15V / (1000+Rp)**.

# Simulations









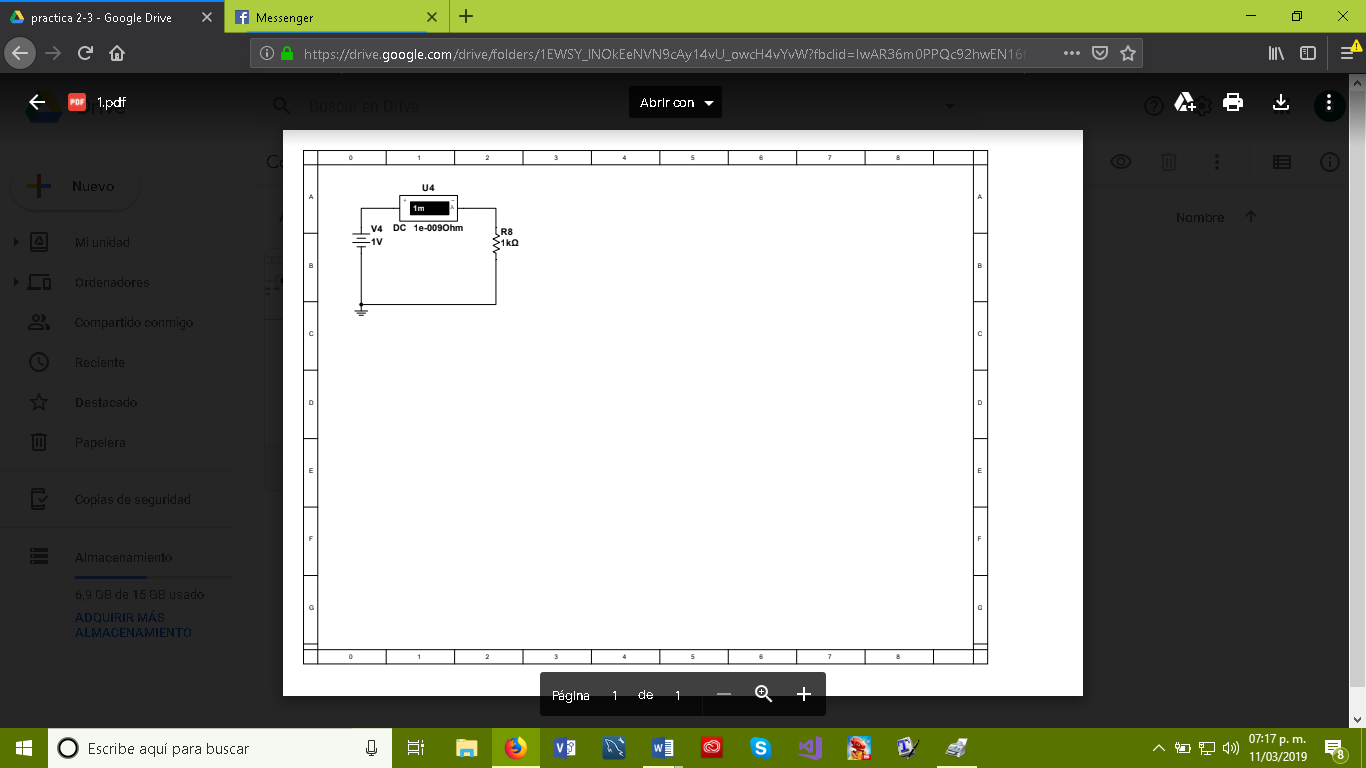


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